Economics of Saskatoon Berry Production

A Ten Acre Enterprise

Alberta

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Saskatoon Berry Production:

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Economics of Saskatoon Berry Production

(A Ten Acre Enterprise)

Introduction

Diversification has become a common word in the agricultural industry, as producers are looking to add value to their business operations and improve their income. Fruit production on the prairies is a diversification option that is gaining interest from new producers to the agricultural industry, producers of traditional crops (grain, oilseeds), and acreage owners looking to find an enterprise that would generate additional revenue. A small fruit enterprise, or one combined with other farm operations, may be an alternative venture for some producers.

The following budgets provide potential saskatoon berry producers with an estimate of capital investment, and annual costs and returns for a ten acre saskatoon berry enterprise. This estimate is based on the data previously obtained from five saskatoon berry producers in Alberta. The original data, which was aggregated to develop group averages, has been updated to reflect rising costs, inflation and changes in production practices. These estimates are intended only as a guide and must be adapted to individual producers and their proposed operation and practices.

Table 1 (page 7) summarizes saskatoon production costs in the 2007 Investment Schedule, which lists equipment requirements for the operation. Table 2 (page 8) provides the Summary of Costs and Returns for a 10 Acre Saskatoon Enterprise. The background information to Table 2 is found in the Appendix (Tables 2-a to 2-d), which contains the annual Field Operations Schedule for crop years one to ten, and the Summary of Costs and Returns per 100-feet of row.

In Table 2, each year is treated as a separate crop. During the first three years, costs are incurred and no returns are realized. By year 4, the saskatoon harvest begins and so do the returns, indicated by the *Contribution Margin* that becomes positive in that year. *Gross Operating Loss/Profit* becomes positive by year 5. *(A further summary of Table 2 is covered in the Conclusions, found on page 6.)*

Please note: These cost and return budgets are estimates only, and are intended as a guide. The users of this information must keep in mind that these figures are based on the production and management expertise of the participants. Users of this guide may adapt these amounts to the costs and practices that better represent their proposed berry operation. Each producer should carefully estimate his/her own capital investment and annual costs and returns before making an investment decision.

Definitions

Gross Revenue is income that is realized from the sale of saskatoon berries.

Cash Costs include plant material, fertilizer, chemicals, custom work (i.e., trenching, and custom pesticide application), and equipment operation and maintenance.

Cash Overhead Costs include taxes, interest on operating loan, and miscellaneous overhead (i.e., a percentage of total cash costs plus taxes).

Non-Cash Costs include depreciation on machinery and equipment, and labour costs.

Contribution Margin is the gross revenue, less cash costs, less interest on operating capital and labour costs.

Interest/ Opportunity Costs. *Interest costs* are based on the operating and investment costs of equipment, at a rate of 7.5%. *Opportunity costs* also use a rate of 7.5% on the current value of land investment. This represents the "opportunity" of holding capital assets and assumes that if land was sold, then proceeds could be invested in other ventures with a return of approximately 7.5%. Land area includes the 10 acre orchard site plus an additional 5 acres for buildings and equipment.

Total Costs include all cash, non-cash costs, interest and opportunity costs.

Gross Operating Loss/Profit, also known as *Return to Equity*, is the difference between gross annual revenue and total annual costs.

Assumptions specific to this enterprise

1. **Site preparation**. Saskatoon berry bushes are planted on ten acres of sandy loam soil. Before planting the seedlings, the site must be prepared over a minimum of one- or two-year period by spraying the weeds, cultivating the soil and lastly setting up a dripline irrigation system. Costs for these operations are included in year one. The site chosen is a grassed field that is sprayed and cultivated for the planting of saskatoon seedlings. Recommended grasses for an orchard site are Sheep's Fescue or Hard Fescue, which are non-creeping, non-invasive types. (Growers may prefer to start with a clean cultivated field in which saskatoon seedlings are planted, later followed by the seeding of pathways to appropriate grasses. In this case, the cost tables would need to be adjusted accordingly.)

2. **Production Cycle**. Adjust the recommended rate of all fertilizers and sprays for an entire field to that of a row crop, by using the treated row area as a percentage of total acreage (i.e., row width x row length, divided by the total acreage area x 100).[1]

[1] Row crop acres: (Row width of 4 feet **x** Row length of 2293 feet of row per ac) / 43,560 ft^2 per ac **x** 100 = 21% of an acre.

Preparation years *(One to two years prior to the planting year)*
- Prepare the site (spray, mow or plant grass, install irrigation mainline and manifold). These preliminary costs are included in year 1 *(Table 2)*.

Year 1 - Spring preparation, spray, cultivate, set-up of dripline irrigation, plant seedlings, and irrigate.

Year 2 - Spray herbicide, irrigate and mow. Apply insecticide to non-bearing plants (i.e., Orthene or Admire, for the control of Woolly Elm Aphid). Apply Linuron in early spring. Replace dead seedlings (approximately 2.5%).

Year 3 - Spot spray herbicide as required (i.e., Linuron, about 1/2 of the area). Irrigate, and mow. Apply insecticide to non-bearing plants (i.e., Orthene or Admire, for the control of Woolly Elm Aphid). Replace dead seedlings (approximately 7.5%), and prune. (Note: If applying Linuron in early spring, then apply Casoron in the fall.)

Year 4 - Spot spray herbicide as required (i.e., Linuron, about 1/8 of the area each year thereafter). Spray insecticide and fungicide, irrigate, mow, and harvest. In the fall, apply Casoron and prune. A fertilizer blend of 46-0-0 and 11-52-0 is applied in two split applications (early May, late June). (Note: Decis application replaces Orthene/Admire starting in year 4 and continues into the following years.)

Year 5 - Spot spray herbicides, spray insecticide and fungicide, irrigate, mow, harvest. Fertilizer blend is applied in two split applications, (early May, late June).

Year 6 - Spot spray herbicides, spray insecticide and fungicide, irrigate, mow, harvest, apply Casoron and prune. Fertilizer blend is applied in two split applications (early May, late June).

Year 7 - Same as Year 5.

Year 8 - Same as Year 6.

Year 9 - Same as Year 7.

Year 10 - Same as Year 8.

Years 11 and beyond - Approximately every five years, the orchard is renovated by mowing the plants. This is to maintain high yielding plants and to keep them at a manageable height and flexibility to facilitate machine harvest.

3. **Plant spacing**. Saskatoon seedlings are generally planted about 2 feet apart within rows, and rows are spaced between 18-20 feet apart for larger berry operations, allowing enough space to operate a mechanical harvester. For the purposes of this study, 2-foot plant spacing will be used *within rows*, and a 19-foot spacing *between rows*. With this spacing, the following estimates are determined:
   - Number of plants per acre is 1,146 plants per acre or 11,463 plants per ten acre orchard (i.e., 43,560 ft^2 per ac/ 2 ft x 19 ft per plant = 1,146/ac).
   - Plant costs at $1.60 per plant, result in a total of $1,834 per acre.

4. **Replanting**. Replacement of plants is approximately 2.5% in the second year and 7.5% in the third year.

5. **Spray Program**. All pesticide treatments must be used as registered and only recommended practices followed, to ensure the safe use of product and its effectiveness.
    - **Banvel/ 2-4-D**. Spray in preparation years (pre-plant phase) at the recommended rate to kill off as many broad leaf weeds as possible on all ten acres.
    - **Roundup**. Spray to kill established grass (fescue) on 4-foot wide strips and 19-foot centers. Mow everything prior to planting.
    - **Bonanza or Treflan (trifluralin)**. Apply prior to planting, to control weed seed germination.
    - **Linuron or Lorox** (linuron). Apply at recommended rate in the early spring of year 2. Apply to base of the plants. Spot spray every year thereafter. In year 3, about 1/2 the area is sprayed, and years 4 to 10 approximately 1/8 of the area is sprayed. *(May apply as a directed spray, either in early spring or in the fall). If the orchard spray program includes applying Casoron in the fall, then may prefer to use Linuron only as a spring application, such as in this orchard scenario .)*
    - **Orthene** or **Admire**. Apply in years 2 and 3, to prevent young seedling loss due to Wooly Elm Aphid. Apply 2L to the base of each plant as a soil drench solution (i.e., product + water). If insecticide solution does not penetrate into root zone, may want to follow with a light irrigation to move product downward.
    - **Casoron**. Apply in years 3 and 4, and every second year thereafter.
    - **Insecticides**. May apply **Orthene** or **Admire** to the soil for plants up to approximately 4-years old (for young plants); applications of **Decis** can start in year 4 (fruit-bearing plants) and continue yearly.
    - **Fungicides** (e.g., **Topas**, **Mission**, **Funginex**, **Kumulus**). Application should start in about year 4 (fruit bearing plants) and continue every year.

6. **Irrigation**. Keep soil moist from May to the end of July. Plants must have adequate moisture before going into the late fall freeze-up. The number of irrigation applications may be increased or reduced depending on the seasonal conditions in a given year and/or the soil type:
    - Year 1: apply 3 times at 6 hours per application
    - Year 2: apply 3 times at 6 hours per application
    - Year 3: apply 3 times at 6 hours per application
    - Year 4: apply 4 times at 12 hours per application
    - Year 5-10: apply 4 times at 24 hours per application. Apply once in the spring, twice when berries are filling, and once in early fall.

7. **Irrigation equipment**. Investment includes the materials for the pump, mainline and manifold and set-up costs for the pump facility.

8. **Fertilizer**. Use a blend of 46-0-0 and 11-52-0 (to achieve 30-50 lbs of actual N per acre and 20-40 lbs of actual P per acre). Both fertilizers are applied at the same time in two applications (i.e., half of blend in early May, and half in late June).

9. **Mow**. Grass must be mowed every 2 to 4 weeks (approximately 5 to 6 times per season).

10. **Harvesting**. The first harvest may start in year 4, with about 600 lbs per acre. Berry production would peak in year 7 or 8, reaching approximately 3,600 lbs per acre (i.e., based on the plant spacing and plant density per acre for this particular orchard). Please note that actual yields could fluctuate dramatically with management and weather *(See below, 'Risks to Consider'.)*

11. **Pruning**. Plants damaged during harvest must be pruned soon after harvest. Pruning was calculated at 300 feet per hour in year 3 and 200 feet per hour for each following year.

12. **Land**. Estimated value of land was at $1,500 per acre. This is an average value for agricultural land [Canada Land Inventory (CLI) Class 1, 2 and 3] taken over 17 counties in Alberta, where the majority of fruit producers are situated.

13. **Interest on Operating**. This was calculated at 7.5% on machinery investment and its use during field operations.

14. **Labour**. A rate of $13.50 per hour represents the operator's and additional labour required for field operations and other activities listed in the budgets.

15. **Direct Cash and Cash Overhead**. Originally, costs were obtained directly from saskatoon berry producers. These were updated to 2007 values using current costs, inflation, and changes in management practices.

16. **Depreciation and Interest**. Costs are based on the hours of use of various machinery and equipment for field operations and other activities listed.

17. **Wildlife**. Not included in the study are the costs of fence materials and its set-up around the perimeter of the orchard, for the control of wildlife.

18. **Renovating the orchard**. Once an orchard is mature, around 12 to 15 years, it is renovated on a five- or six-year cycle. This involves mowing the plants and allowing younger stems to grow back as a replacement. As a result, there is a loss of at least *one crop year* out of five, and with some cultivars, such as Smokey, there is usually a loss of *two crop years* out of five.

Risks to Consider

The 18 assumptions stated previously are used as the basis to create Table 2. In assessing the costs and returns in Table 2, there are a number of risks to keep in mind:

- Table 2 figures represent the *average* costs and returns of a ten acre orchard, and also assume *ideal* conditions. Yields of 3,600 lbs/acre for a mature orchard may be a conservative estimate, compared to some orchards in the province.
- At the same time, yields could be reduced by as much as *one-half*, due to inadequate irrigation or fertilizer. Wildlife may also cause considerable damage to plants and their yield potential.

- During certain years, disease may become prominent and destroy crops in an entire region. Diligent monitoring and pest control practices are required to minimize these risks.
- Beyond the tenth year, renovating the orchard is required. This results in crop returns of three or four years *out of every five*, before the orchard is renovated again. Renovation years need to be taken into account when assessing cash flow and accumulated return/deficits *(Line K. in Table 2)*.

Recommendations

In order to maximize returns from a ten acre saskatoon enterprise, producers may consider planting saskatoons into a cultivated field and producing row crops between the saskatoon rows before seeding this area to grass. Suggested crops could be annual fruits or vegetables, alfalfa, forage or cereal crops.

It is very important that a high level of the day-to-day management activities be maintained (i.e., weed control, timely application of irrigation, fertilizer, herbicides and pesticides, pruning, harvesting, etc.) to obtain high volumes of top quality fruit.

Conclusion

The costs and returns for a ten acre saskatoon berry enterprise are summarized in Table 2. This table portrays that, beginning in year 4, returns are realized as the saskatoon harvest begins. In this year, the *Contribution Margin*, or returns over variable costs, becomes positive and reaches a total greater than $5,100 (line *G.*). Starting in year 5, the *Gross Operating Loss/Profit*, or returns over total costs, becomes positive and totals more than $14,300 (line *J.*). By year 6, these returns increase by almost three fold to approximately $41,000 (line *J.*) and continue to increase until the orchard is mature. In years 7 to 10, annual returns fluctuate between $57,300 and $55,400 depending on the operations required that year.

Based on the assumptions for this enterprise, net profitability would be realized in year 6, as accumulated expenses from the previous years have been covered and the accumulated net returns become positive, reaching more than $3,700 (line *K. Accumulated Return/Deficit*). From this year forward, overall profitability of the saskatoon enterprise continues to increase, reaching $230,000 by year 10. Beyond year 10, other costs may need to be incorporated, such as those relating to orchard renovation.

The assumptions in this budget are based on the purchase of new equipment used solely for this enterprise, and are also based on an average saskatoon operation within the province. Each individual enterprise using these budgets would need to adjust the expenses to their individual farm practices or those specific to their region.

This study portrays that a saskatoon berry operation offers a viable opportunity for farm and crop diversification, especially when used in conjunction with other business ventures that can absorb overhead and other costs in the early years. These early years include the seedling and early production stages, before saskatoon plants are able to produce substantial volumes of fruit.

SASKATOON PRODUCTION COSTS

2007 INVESTMENT SCHEDULE

TABLE 1

Labour cost/hr	$13.50	
Interest on machinery	7.5	%
Interest on operating	7.5	%
Gasoline	$0.84	per litre
Diesel	$0.73	per litre

									TOTAL per YEAR	
Machine Number	Description	New Value ($)	Years of Life	Salvage Value ($)	Hours of Use/yr	Operating ($/hr)	Deprec. ($/hr)	Invest. ($/hr)	Deprec. Cost ($)	Invest. Cost ($)
1	Tractor 50HP	31,200	15	6,070	50	9.31	33.51	27.95	1,675	1,398
2	Mower 10 ft	7,500	15	720	20	1.57	22.60	15.41	452	308
3	Sprayer - Blast	15,000	15	1,440	10	3.05	90.40	61.65	904	617
4	Sprayer - Granular	1,500	15	140	10	0.89	9.07	6.15	91	62
5	Sprayer - Tractor Mount	2,500	15	240	10	0.56	15.07	10.28	151	103
6	Sprayer Safety Equipment	750	15	70	10	0.15	4.53	3.08	45	31
7	Pruning Equipment	2,200	15	210	121	2.18	1.10	0.75	133	90
8	Small tools	750	20	375	10	0.00	1.88	4.22	19	42
9	Harvester 1/4 share	25,000	20	1,390	50	4.55	23.61	19.79	1,181	990
10	Irrigation- Pump & Mainline	5,000	7	1,360	600	2.63	0.87	0.40	520	239
11	Irrigation - Field	11,500	10	2,170	600	0.09	1.56	0.85	933	513
12	Berry Trays	3,700	15	360	100	0.00	2.23	1.52	223	152
13	Truck 1/2	25,000	10	4,420	300	6.60	6.86	3.68	2,058	1,103
14	Buildings (40'x50')	67,900	25	13,580					2,173	3,056
15	Cleaning Table	3,400	25	340					122	140
16	Cooler & Freezer	17,000	20	1,700					765	701
	TOTAL	219,900		34,585					11,444	9,543

TABLE 2 SUMMARY OF COSTS AND RETURNS FOR A 10 ACRE SASKATOON ENTERPRISE

($ per 10 Acres)

	Year 1*	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10*
Lbs/ 10 Acres	0	0	0	5,732	14,329	28,658	35,822	35,822	35,822	35,822
$/lb	2	2	2	2.00	2.00	2.00	2.00	2.00	2.00	2.00
A. Gross Revenue	**0**	**0**	**0**	**11,463**	**28,658**	**57,316**	**71,645**	**71,645**	**71,645**	**71,645**
Direct Cash Costs										
Plant Material	18,341	459	1,376	-	-	-	-	-	-	-
Fertilizer	-	-	-	95	95	95	95	95	95	95
Chemicals	485	1,131	2,490	1,527	109	1,527	109	1,527	109	1,527
Custom Work	888	2,542	2,542	-	-	-	-	-	-	-
Equip. Op. & Maint.	344	397	585	1,590	2,311	2,333	2,311	2,333	2,311	2,333
B. Total Cash Costs	**20,058**	**4,529**	**6,992**	**3,212**	**2,515**	**3,954**	**2,515**	**3,954**	**2,515**	**3,954**
Cash Overhead Costs										
Taxes	55	55	55	55	55	55	55	55	55	55
Interest on Operating Capital	754	172	264	123	96	150	96	150	96	150
Misc. Overhead (15% of Total Cash +Taxes)	3,017	688	1,057	490	385	601	385	601	385	601
C. Total Cash Overhead	**3,826**	**914**	**1,376**	**668**	**537**	**807**	**537**	**807**	**537**	**807**
D. Total Cash Costs (B+C)	**23,884**	**5,443**	**8,369**	**3,879**	**3,052**	**4,761**	**3,052**	**4,761**	**3,052**	**4,761**
Non-Cash Costs										
Depreciation	574	853	1,025	3,692	4,264	4,353	4,264	4,353	4,264	4,353
Labour Costs (excludes custom work)	1,954	223	1,375	2,960	2,931	2,960	2,931	2,960	2,931	2,960
E. Total Non-Cash Costs	**2,528**	**1,076**	**2,400**	**6,652**	**7,195**	**7,312**	**7,195**	**7,312**	**7,195**	**7,312**
F. Total Above Costs (B+C+E)	**26,412**	**6,519**	**10,769**	**10,531**	**10,247**	**12,073**	**10,247**	**12,073**	**10,247**	**12,073**
G. Contribution Margin (A-B-Int.-Labour)	**(22,765)**	**(4,924)**	**(8,631)**	**5,169**	**23,115**	**50,252**	**66,102**	**64,581**	**66,102**	**64,581**
Interest/ Opportunity Costs:										
Land	1,125	1,125	1,125	1,125	1,125	1,125	1,125	1,125	1,125	1,125
Bulidings & Equipment	384	598	726	2,705	2,975	3,046	2,975	3,046	2,975	3,046
H. Total Interest Costs	**1,509**	**1,723**	**1,851**	**3,830**	**4,100**	**4,171**	**4,100**	**4,171**	**4,100**	**4,171**
I. TOTAL COSTS (F+H)	**27,921**	**8,242**	**12,619**	**14,361**	**14,348**	**16,245**	**14,348**	**16,245**	**14,348**	**16,245**
J. GROSS OPERATING LOSS/PROFIT (A-I)	**(27,921)**	**(8,242)**	**(12,619)**	**(2,898)**	**14,310**	**41,071**	**57,297**	**55,400**	**57,297**	**55,400**
K. Accumulated Return/Deficit	(27,921)	(36,162)	(48,782)	(51,679)	(37,369)	3,702	60,999	116,400	173,697	229,097

Notes: *Some costs included in Year 1 will incur prior to planting of saskatoon seedlings. After Year 10, orchard renovation (about every 5 yrs) results in some yield loss.

Line G. Contribution Margin represents (Gross Revenue - Cash costs - Interest on Operating Capital - Labour).

Line J. represents gross profit over all costs. Also called *Return to Equity*.

Line K. represents the returns to capital and management from activities specified in years 1-10.

APPENDIX

The following tables provide background information to the final costs and returns table for the saskatoon berry ten acre enterprise (Table 2). **Tables 2-a** to **2-c** of the Appendix present the breakdown of annual field operation costs for years one to ten. **Table 2-d** summarizes these annual costs into a costs and returns table, reporting them as $cost/100-feet of row, and later converting them into $cost/10 acres (Table 2).

List of tables:

- **Tables 2-a to 2-c** Annual field operation schedule for years 1-10, reported in $cost/100-feet of row
- **Table 2-d** Summary of cost and returns, reported in $cost/100-feet of row

Assumptions:

The table below refers to field operations, such as the mowing of grass, and pesticide/fertilizer applications, and indicates the background calculations used in the field operations schedule (Tables 2-a to 2-c).

The second column, *Area covered*, represents the area treated for each field operation, and converts the recommended amount of pesticide/fertilizer per acre to the specific row crop area (i.e., using the dimensions for this particular saskatoon enterprise). The columns, *Number of passes per row* multiplied by the *Number of times per year*, result in the totals for *Times done per row*, a column that is used in Tables 2-a to 2-c.

Field operation	Area covered	Number of passes per row	Number of times per year	Times done per row
Mowing	--N/A--	2 passes	1 to 5	2 to 10
Banvel/2-4-D	Entire area	1 pass	1	1
Roundup	21%	1 pass	1	1
Bonanza	21%	1 pass	1	1
Linuron	21% in Year 2, then spot sprayed	2 passes	1	2
Casoron	21%	2 passes	1	2
Fertilizer blend	21%	2 passes	2	4
Orthene	--N/A-- (Custom applied)	2 passes (1L per side of plant)	1	
Decis	Row length x Tree height (5')	1 pass; sprayed from both sides of the boom, 2 half-rows at a time	3	3
Topas	Row length x Tree height (5')	1 pass; sprayed from both sides of the boom, 2 half-rows at a time	2	2
Kumulus	Row length x Tree height (5')	1 pass; sprayed from both sides of the boom, 2 half-rows at a time	1	1

TABLE 2-a **FIELD OPERATIONS SCHEDULE**

Crop: Saskatoons Year 1 ($ per 100 feet of row)

Description	Machine number		Times Done per row	Speed MPH	Number of 100 Ft of row per hour	Machine hours per oper	Labour hours per oper	Material & Other	Operating	Deprec.	Interest	Labour & Custom	TOTAL
								Cost $/ 100-Feet of row					
Mow	1	2	2	6	316.80	1.1	1.1		$0.08	$0.39	$0.30	$0.09	$0.86
Banvel/2-4-D	1	5	1	4	211.20	1.5	1.6	$1.77	$0.07	$0.34	$0.27	$0.10	$2.56
Roundup	1	5	1	4	211.20	1.5	1.6	$0.08	$0.07	$0.34	$0.27	$0.10	$0.87
Bonanza	1	5	1	4	211.20	1.5	1.6	$0.26	$0.07	$0.34	$0.27	$0.10	$1.05
Bury Mainline & Manifold (Custom)*	0	0	1		1,350.00		1.0	$3.87	$0.00	$0.00	$0.00	$0.01	$3.88
Plant Saskatoons	0	0	1		1.69	1.0	1.0	$80.00	$0.00	$0.00	$0.00	$8.00	$88.00
Lay Drip Line	0	0	1		1,350.00		1.0	-	$0.00	$0.00	$0.00	$0.01	$0.01
Irrigation	10	11	3		40.33	6.0	0.1	$0.00	$1.21	$1.08	$0.56	$0.10	$2.95
							TOTAL	$85.99	$1.50	$2.51	$1.67	$8.52	$100.19

Crop: Saskatoons Year 2

Description	Machine number		Times Done per row	Speed MPH	Number of 100 Ft of row per hour	Machine hours per oper	Labour hours per oper	Material & Other	Operating	Deprec.	Interest	Labour & Custom	TOTAL
								Cost $/ 100-Feet of row					
Irrigation	10	11	3		40.33	6.0	0.1	$0.00	$1.21	$1.08	$0.56	$0.10	$2.95
Linuron	1	5	2	4	211.20	1.5	1.6	$0.51	$0.14	$0.69	$0.54	$0.20	$2.09
Orthene (Custom Applied)*								$4.42	$0.00	$0.00	$0.00	$11.09	$15.51
Mow	1	2	10	6	316.80	1.1	1.1	$0.00	$0.38	$1.95	$1.51	$0.47	$4.30
Replant	0	0	1		67.50	1.0	1.0	$2.00	$0.00	$0.00	$0.00	$0.20	$2.20
							TOTAL	$6.93	$1.73	$3.72	$2.61	$12.06	$27.05

Notes: Years 1-10: Recommended application rates for fertilzers, herbicides, fungicides and insecticides are adjusted to treated row area (i.e., as a % of total acreage)

Years 1-10: For Mowing, Fertilizer, Linuron, and Casoron activities, 'Times done/row' includes 2 passes/row

*Custom work: Year 1= Mainline/manifold set-up; Years 2 & 3= Orthene product cost + estimated custom application costs (actual commercial pesticide applcation costs not provided)

TABLE 2-b **FIELD OPERATIONS SCHEDULE**

Crop: Saskatoons Year 3

($ per 100 feet of row)

Description	Machine number		Times Done per row	Speed MPH	Number of 100 Ft of row per hour	Machine hours per oper	Labour hours per oper	Material & Other	Operating	Deprec.	Interest	Labour & Custom	TOTAL
								Cost $/ 100-Feet of row					
Irrigation	10	11	3		40.33	6.0	0.1	$0.00	$1.21	$1.08	$0.56	$0.10	$2.95
Linuron	1	5	2	4	211.20	1.5	1.6	$0.26	$0.14	$0.69	$0.54	$0.20	$1.83
Casoron	1	4	2	5	264.00	1.2	1.2	$6.18	$0.09	$0.39	$0.31	$0.12	$7.10
Orthene (Custom Applied)*								$4.42	$0.00	$0.00	$0.00	$11.09	$15.51
Mow	1	2	10	6	316.80	1.1	1.1	$0.00	$0.38	$1.95	$1.51	$0.47	$4.30
Replant	0	0	1		22.50	1.0	1.0	$6.00	$0.00	$0.00	$0.00	$0.60	$6.60
Pruning	7		1		3.00	1.0	1.0	$0.00	$0.73	$0.37	$0.25	$4.50	$5.84
							TOTAL	$16.86	$2.55	$4.47	$3.17	$17.08	$44.13

Crop: Saskatoons Year 4

Description	Machine number		Times Done per row	Speed MPH	Number of 100 Ft of row per hour	Machine hours per oper	Labour hours per oper	Material & Other	Operating	Deprec.	Interest	Labour & Custom	TOTAL
								Cost $/ 100-Feet of row					
Irrigation	10	11	4		40.33	12.0	0.1	$0.00	$3.24	$2.88	$1.49	$0.13	$7.74
Linuron	1	5	2	4	211.20	1.5	1.6	$0.06	$0.14	$0.69	$0.54	$0.20	$1.64
Topas	1	3	2	6	316.80	1.5	1.6	$0.21	$0.12	$1.17	$0.85	$0.14	$2.48
Kumulus	1	3	1	6	316.80	1.5	1.6	$0.11	$0.06	$0.59	$0.42	$0.07	$1.25
Decis	1	3	3	6	316.80	1.5	1.6	$0.09	$0.18	$1.76	$1.27	$0.20	$3.50
Casoron	1	4	2	5	264.00	1.2	1.2	$6.18	$0.09	$0.39	$0.31	$0.12	$7.10
Fertilizer	1	4	4	5	264.00	1.1	1.2	$0.41	$0.17	$0.71	$0.57	$0.25	$2.11
Mow	1	2	10	6	316.80	1.1	1.1	$0.00	$0.38	$1.95	$1.51	$0.47	$4.30
Harvest	1	9	2	0.5	26.40	1.2	3.6	$0.00	$1.26	$5.19	$4.34	$3.68	$14.47
Freight to cleaning plant	13		2		60.50	1.0	2.0		$0.22	$0.23	$0.12	$0.89	$1.46
Pruning	7		1		2.00	1.0	1.0		$1.09	$0.55	$0.37	$6.75	$8.76
							TOTAL	$7.07	$6.94	$16.10	$11.80	$12.91	$54.82

Notes: Years 1-10: Recommended application rates for fertilzers, herbicides, fungicides and insecticides are adjusted to treated row area (i.e., as a % of total acreage)

Years 1-10: For Mowing, Fertilizer, Linuron, and Casoron activities, 'Times done/row' includes 2 passes/row

*Custom work: Years 2 & 3= Orthene product cost + estimated custom application costs (actual commercial pesticide application costs not provided)

TABLE 2-c **FIELD OPERATIONS SCHEDULE**

Crop: Saskatoons Years 5, 7, 9

($ per 100 feet of row)

Description	Machine number		Times Done per row	Speed MPH	Number of 100 Ft of row per hour	Machine hours per oper	Labour hours per oper	Material & Other	Operating	Deprec.	Interest	Labour & Custom	TOTAL
								Cost $/ 100-Feet of row					
Irrigation	10	11	4		40.33	24.0	0.1	$0.00	$6.48	$5.76	$2.98	$0.13	$15.35
Linuron	1	5	2	4	211.20	1.5	1.6	$0.06	$0.14	$0.69	$0.54	$0.20	$1.64
Topas	1	3	2	6	316.80	1.5	1.6	$0.21	$0.12	$1.17	$0.85	$0.14	$2.48
Kumulus	1	3	1	6	316.80	1.5	1.6	$0.11	$0.06	$0.59	$0.42	$0.07	$1.25
Decis	1	3	3	6	316.80	1.5	1.6	$0.09	$0.18	$1.76	$1.27	$0.20	$3.50
Fertilizer	1	4	4	5	264.00	1.1	1.2	$0.41	$0.17	$0.71	$0.57	$0.25	$2.11
Mow	1	2	10	6	316.80	1.1	1.1	$0.00	$0.38	$1.95	$1.51	$0.47	$4.30
Harvest	1	9	2	0.5	26.40	1.2	3.6	$0.00	$1.26	$5.19	$4.34	$3.68	$14.47
Freight to cleaning plant	13		2		60.50	1.0	2.0		$0.22	$0.23	$0.12	$0.89	$1.46
Pruning	7		1		2.00	1.0	1.0		$1.09	$0.55	$0.37	$6.75	$8.76
							TOTAL	$0.89	$10.08	$18.60	$12.98	$12.79	$55.33

Crop: Saskatoons Years 6, 8, 10

Description	Machine number		Times Done per row	Speed MPH	Number of 100 Ft of row per hour	Machine hours per oper	Labour hours per oper	Material & Other	Operating	Deprec.	Interest	Labour & Custom	TOTAL
								Cost $/ 100-Feet of row					
Irrigation	10	11	4		40.33	24.0	0.1	$0.00	$6.48	$5.76	$2.98	$0.13	$15.35
Linuron	1	5	2	4	211.20	1.5	1.6	$0.06	$0.14	$0.69	$0.54	$0.20	$1.64
Topas	1	3	2	6	316.80	1.5	1.6	$0.21	$0.12	$1.17	$0.85	$0.14	$2.48
Kumulus	1	3	1	6	316.80	1.5	1.6	$0.11	$0.06	$0.59	$0.42	$0.07	$1.25
Decis	1	3	3	6	316.80	1.5	1.6	$0.09	$0.18	$1.76	$1.27	$0.20	$3.50
Casoron	1	4	2	5	264.00	1.2	1.2	$6.18	$0.09	$0.39	$0.31	$0.12	$7.10
Fertilizer	1	4	4	5	264.00	1.1	1.2	$0.41	$0.17	$0.71	$0.57	$0.25	$2.11
Mow	1	2	10	6	316.80	1.1	1.1	$0.00	$0.38	$1.95	$1.51	$0.47	$4.30
Harvest	1	9	2	0.5	26.40	1.2	3.6	$0.00	$1.26	$5.19	$4.34	$3.68	$14.47
Freight to cleaning plant	13		2		60.50	1.0	2.0		$0.22	$0.23	$0.12	$0.89	$1.46
Pruning	7		1		2.00	1.0	1.0		$1.09	$0.55	$0.37	$6.75	$8.76
							TOTAL	$7.07	$10.17	$18.99	$13.29	$12.91	$62.43

Notes: Years 1-10: Recommended application rates for fertilizers, herbicides, fungicides and insecticides are adjusted to treated row area (i.e., as a % of total acreage)

Years 1-10: For Mowing, Fertilizer, Linuron, and Casoron activities, 'Times done/row' includes 2 passes/row

TABLE 2-d

SUMMARY OF COSTS AND RETURNS

($ per 100-feet of row)

	Year 1*	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Lbs/ 100-feet of row	-	-	-	25.00	62.50	125.00	156.25	156.25	156.25	156.25
$/lb	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
A. Gross Revenue	-	-	-	**50.00**	**125.00**	**250.00**	**312.50**	**312.50**	**312.50**	**312.50**
Direct Cash Costs										
Plant Material	80.00	2.00	6.00	-	-	-	-	-	-	-
Fertilizer	-	-	-	0.41	0.41	0.41	0.41	0.41	0.41	0.41
Chemicals	2.12	4.93	10.86	6.66	0.48	6.66	0.48	6.66	0.48	6.66
Custom Work	3.87	11.09	11.09							
Equip. Op. & Maint.	1.50	1.73	2.55	6.94	10.08	10.17	10.08	10.17	10.08	10.17
B. Total Cash Costs	**87.49**	**19.75**	**30.50**	**14.01**	**10.97**	**17.25**	**10.97**	**17.25**	**10.97**	**17.25**
Cash Overhead Costs										
Taxes	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
Interest on Operating Capital	3.29	0.75	1.15	0.53	0.42	0.66	0.42	0.66	0.42	0.66
Misc. Overhead (15% of Total Cash +Taxes)	13.16	3.00	4.61	2.14	1.68	2.62	1.68	2.62	1.68	2.62
C. Total Cash Overhead	**16.69**	**3.99**	**6.00**	**2.91**	**2.34**	**3.52**	**2.34**	**3.52**	**2.34**	**3.52**
D. Total Cash Costs (B+C)	**104.18**	**23.74**	**36.50**	**16.92**	**13.31**	**20.77**	**13.31**	**20.77**	**13.31**	**20.77**
Non-Cash Costs										
Depreciation	2.51	3.72	4.47	16.10	18.60	18.99	18.60	18.99	18.60	18.99
Labour Costs (excludes custom work)	8.52	0.97	6.00	12.91	12.79	12.91	12.79	12.91	12.79	12.91
E. Total Non-Cash Costs	**11.03**	**4.69**	**10.47**	**29.01**	**31.39**	**31.89**	**31.39**	**31.89**	**31.39**	**31.89**
F. Total Above Costs (B+C+E)	**115.20**	**28.43**	**46.97**	**45.93**	**44.70**	**52.66**	**44.70**	**52.66**	**44.70**	**52.66**
G. Contribution Margin (A-B-Int.-Labour)	**(99.30)**	**(21.48)**	**(37.65)**	**22.55**	**100.82**	**219.19**	**288.32**	**281.69**	**288.32**	**281.69**
Interest/ Opportunity Costs:										
Land	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91	4.91
Buildings & Equipment	1.67	2.61	3.17	11.80	12.98	13.29	12.98	13.29	12.98	13.29
H. Total Interest Costs	**6.58**	**7.51**	**8.07**	**16.70**	**17.88**	**18.19**	**17.88**	**18.19**	**17.88**	**18.19**
I. TOTAL COSTS (F+H)	**121.78**	**35.95**	**55.04**	**62.64**	**62.58**	**70.86**	**62.58**	**70.86**	**62.58**	**70.86**
J. GROSS OPERATING LOSS/PROFIT (A-I)	**(121.78)**	**(35.95)**	**(55.04)**	**(12.64)**	**62.42**	**179.14**	**249.92**	**241.64**	**249.92**	**241.64**

*Some of the costs included in Year 1 will incur prior to planting of saskatoon seedlings.

Note: See Table 2 for the Summary of Costs and Returns per 10 acres.